RELIABILITY REPORT

FOR

MAX7419CUA+
(MAX7418 - MAX7425)

PLASTIC ENCAPSULATED DEVICES

December 16, 2008

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

| **Approved by** |
| --- |
| Ken Wendel |
| Quality Assurance |
| Director, Reliability Engineering |

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**Conclusion**

The MAX7419CUA+ successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim"s continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim"s quality and reliability standards.

**Table of Contents**



**I. Device Description**

A. General

The MAX7418-MAX7425 5th-order, low-pass, switched-capacitor filters (SCFs) operate from a single +5V (MAX7418-MAX7421) or +3V (MAX7422-MAX7425) supply. These devices draw only 3mA of supply current and allow corner frequencies from 1Hz to 45kHz, making them ideal for low-power post-DAC filtering and anti-aliasing applications. They feature a shutdown mode that reduces supply current to 0.2µA. Two clocking options are available: self-clocking (through the use of an external capacitor), or external clocking for tighter corner-frequency control. An offset adjust pin allows for adjustment of the DC output level. The MAX7418/MAX7422 deliver 53dB of stopband rejection and a sharp rolloff with a 1.6 transition ratio. The MAX7421/MAX7425 achieve a sharper rolloff with a 1.25 transition ratio while still providing 37dB of stopband rejection. The MAX7419/MAX7423 Bessel filters provide low overshoot and fast settling, and the MAX7420/MAX7424 Butterworth filters provide a maximally flat passband response. Their fixed response simplifies the design task of selecting a clock frequency.

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## II. Manufacturing Information

| | |
|---|---|
| A. Description/Function: | 5th-Order, Lowpass, Switched-Capacitor Filters |
| B. Process: | C6Y |
| C. Number of Device Transistors: | 1396 |
| D. Fabrication Location: | Japan |
| E. Assembly Location: | ATP Philippines, Unisem Malaysia, UTL Thailand |
| F. Date of Initial Production: | October 21, 2000 |

## III. Packaging Information

| | |
|---|---|
| A. Package Type: | 8-pin uMAX |
| B. Lead Frame: | Copper |
| C. Lead Finish: | 100% matte Tin |
| D. Die Attach: | Conductive Epoxy |
| E. Bondwire: | Au (1.3 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | # |
| H. Flammability Rating: | Class UL94-V0 |
| I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C | Level 1 |
| J. Single Layer Theta Ja: | 221°C/W |
| K. Single Layer Theta Jc: | 41.9°C/W |
| L. Multi Layer Theta Ja: | 206.3°C/W |
| M. Multi Layer Theta Jc: | 41.9°C/W |

## IV. Die Information

| | |
|---|---|
| A. Dimensions: | 59 X 81 mils |
| B. Passivation: | SiO2/SiN3 |
| C. Interconnect: | Al/Cu |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | 0.6um |
| F. Minimum Metal Spacing: | 0.6um |
| G. Bondpad Dimensions: | 5 mil. Sq. |
| H. Isolation Dielectric: | SiO2 |
| I. Die Separation Method: | Saw |

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## V. Quality Assurance Information

| | |
|---|---|
| A. Quality Assurance Contacts: | Ken Wendel (Director, Reliability Engineering)<br>Bryan Preeshl (Managing Director of QA) |
| B. Outgoing Inspection Level: | 0.1% for all electrical parameters guaranteed by the Datasheet.<br>0.1% For all Visual Defects. |
| C. Observed Outgoing Defect Rate: | < 50 ppm |
| D. Sampling Plan: | Mil-Std-105D |

## VI. Reliability Evaluation

A. Accelerated Life Test

The results of the biased (static) life test are complete. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (Chi square value for MTTF upper limit)

(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$\lambda = 13.4 \times 10^{-9}$

$\lambda$ = 13.4 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the C6 Process results in a FIT Rate of 0.82 @ 25C and 14.21 @ 55C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

C. E.S.D. and Latch-Up Testing

The AF17-5 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

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**Table 1**
Reliability Evaluation Test Results

**MAX7419CUA+**

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES |
|---|---|---|---|---|
| **Static Life Test** (Note 1) | | | | |
| | Ta =<br>Biased<br>Time = 192 hrs. | DC Parameters & functionality | 80 | 5 |
| **Moisture Testing** (Note 2) | | | | |
| 85/85 | Ta = 85°C<br>RH = 85%<br>Biased<br>Time = 1000hrs. | DC Parameters & functionality | 77 | 0 |
| **Mechanical Stress** (Note 2) | | | | |
| Temperature Cycle | -65°C/150°C<br>1000 Cycles<br>Method 1010 | DC Parameters & functionality | 77 | 0 |

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data

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